

WHAT IS CLAIMED IS:

1. An aircraft engine assembly adapted to attenuate noise,  
said engine assembly comprising:

a nacelle including an inlet section coupled to a main section  
adapted to support an engine and fan assembly therewithin; and

5 a one piece annular acoustic panel that forms a segment of an  
internal wall of the nacelle, wherein the annular acoustic panel extends from a  
forward portion of the inlet section to a forward portion of the main section.

2. The engine assembly of Claim 1, wherein the annular  
acoustic panel extends from a forward portion of the inlet section to a forward  
10 portion of the main section such that a junction between the inlet portion and  
the main portion is covered by the annular acoustic panel.

3. The engine assembly of Claim 2, wherein the annular  
acoustic panel extends from the forward portion of the inlet section to a point  
in the forward portion of the main section that is forward of a face of a fan  
15 included in the fan assembly.

4. The engine assembly of Claim 2, wherein the annular  
acoustic panel extends from the forward portion of the inlet section to a point  
in the forward portion of the main section that is even with a face of a fan  
included in the fan assembly.

20 5. The engine assembly of Claim 1, wherein the annular  
acoustic panel is integrated within the internal wall of the nacelle such that an  
aerodynamically clean interior surface of a portion of the nacelle forward of  
the fan assembly is formed that is free from discontinuities, thereby reducing  
excrescence drag within the engine assembly.

25 6. The engine assembly of Claim 1, wherein the annular  
acoustic panel is integrated with in the internal wall of the nacelle such that  
multiple leak paths are substantially eliminated.

7. The engine assembly of Claim 1, wherein the annular acoustic panel is integrated with in the internal wall of the nacelle such that functionality of a fan blade containment structure included in the main portion of the nacelle is maintained.

5 8. The engine assembly of Claim 1, wherein the engine assembly further includes an aft seal between an aft edge of the annular acoustic panel and one of a engine fan acoustic liner and a engine fan wear strip, thereby forming an air tight seal around the aft edge of the annular acoustic panel.

10 9. The engine assembly of Claim 8, wherein the engine assembly further includes a forward seal between a forward edge of the annular acoustic panel and an aft edge of a lip of the inlet section, thereby forming an air tight seal around the forward edge of the annular acoustic panel.

15 10. The engine assembly of Claim 1, wherein the annular acoustic panel is adapted to be tunable to match a noise signature of at least one of the engine and the fan assembly.

11. A method for attenuating noise produced by an aircraft engine assembly, said method comprising:

5 absorbing noise produced by at least one of an engine and a fan assembly included in the engine assembly utilizing a monolithic annular acoustic panel integrated within an internal wall of an engine assembly nacelle; and

substantially eliminating multiple leak paths within a portion of the nacelle forward of the fan assembly, utilizing the monolithic annular acoustic panel.

10 12. The method of Claim 11, wherein absorbing noise utilizing the annular acoustic panel comprises integrating the annular acoustic panel within the internal wall such that the annular acoustic panel extends from a forward portion of an inlet section of the nacelle to a forward portion of a main section of the nacelle.

15 13. The method of Claim 12, wherein integrating the annular acoustic panel within the internal wall comprises integrating the annular acoustic panel within the internal wall such that the annular acoustic panel extends from the forward portion of the inlet section to a point in the forward portion of the main section that is forward of a face of a fan included in the  
20 fan assembly.

14. The method of Claim 12, wherein integrating the annular acoustic panel within the internal wall comprises integrating the annular acoustic panel within the internal such that the annular acoustic panel extends from the forward portion of the inlet section to a point in the forward  
25 portion of the main section that is even with a face of a fan included in the fan assembly.

15. The method of Claim 11, wherein substantially eliminating multiple leak paths within a portion of the nacelle forward of the fan assembly comprises integrating the annular acoustic panel within the

internal wall such that a main bulkhead between the inlet portion and the main portion is covered by the annular acoustic panel.

5           16. The method of Claim 11, wherein absorbing noise utilizing the annular acoustic panel comprises integrating the annular acoustic panel within the internal wall of the nacelle such that an aerodynamically clean interior surface of the portion of the nacelle forward of the fan assembly is formed that is free from discontinuities, thereby reducing excrescence drag within the engine assembly.

10           17. The method of Claim 11, wherein substantially eliminating multiple leak paths within a portion of the nacelle forward of the fan assembly comprises forming an air tight seal around an aft edge of the annular acoustic panel utilizing an aft seal located between the aft edge of the annular acoustic panel and a forward edge of one of a engine fan case acoustic liner and an engine fan wear strip.

15           18. The method of Claim 11, wherein substantially eliminating multiple leak paths within a portion of the nacelle forward of the fan assembly further comprises forming an air tight seal around a forward edge of the annular acoustic panel utilizing a forward seal located between the forward edge of the annular acoustic panel and an aft edge of a lip of the  
20       inlet section.

          19. The method of Claim 11, wherein absorbing noise utilizing the annular acoustic panel comprises tuning the annular acoustic panel to match a noise signature of at least one of the engine and the fan assembly.

20. An aircraft adapted to reduce engine noise, said aircraft comprising:

an engine assembly, wherein said engine assembly comprises:

5 a nacelle including an inlet section coupled at a main bulkhead to a main section adapted to support an engine and fan assembly therewithin; and

10 a one piece annular acoustic panel integrated within an internal wall of the nacelle, whereby the annular acoustic panel extends from a forward portion of the inlet section to a forward portion of the main section such that the main bulkhead is covered by the annular acoustic panel.

21. The engine assembly of Claim 20, wherein the annular acoustic panel is integrated within the internal wall of the nacelle such that an aerodynamically clean interior surface of a portion of the nacelle forward of the fan assembly is formed that is free from discontinuities, thereby reducing  
15 excrescence drag within the engine assembly.

22. The engine assembly of Claim 20, wherein the annular acoustic panel is integrated with in the internal wall of the nacelle such that multiple leak paths are substantially eliminated.

23. The engine assembly of Claim 20, wherein the annular  
20 acoustic panel is integrated with in the internal wall of the nacelle such that the integrity of a fan blade containment structure included in the main portion of the nacelle is maintained.

24. The engine assembly of Claim 20, wherein the engine  
25 assembly further includes an aft seal between an aft edge of the annular acoustic panel and an aft edge of one an engine fan case acoustic liner and an engine fan wear strip, thereby forming an air tight seal around the aft edge of the annular acoustic panel.

25. The engine assembly of Claim 24, wherein the engine assembly further includes a forward seal between a forward edge of the annular acoustic panel and an aft edge of a lip of the inlet section, thereby forming an air tight seal around the forward edge of the annular acoustic panel.

26. The engine assembly of Claim 20, wherein the annular acoustic panel extends from the forward portion of the inlet section to a point in the forward portion of the main section that is forward of a face of a fan included in the fan assembly.

27. The engine assembly of Claim 20, wherein the annular acoustic panel extends from the forward portion of the inlet section to a point in the forward portion of the main section that is even with a face of a fan included in the fan assembly.

28. The engine assembly of Claim 20, wherein the annular acoustic panel is adapted to be tunable to match a noise signature of at least one of the engine and the fan assembly.